

What is claimed is:

1. A gas decompression device which decompresses gas to be supplied to a fuel cell in fuel cell system, the gas decompression device comprising:

5 a body which includes an inlet, an outlet, and an internal space;

a diaphragm which divides the internal space into a measuring room and a back pressure room;

a valve seat which is provided for the measuring room and
10 arranged between the inlet and the outlet;

a valve body which is provided for the valve seat and interlocked with the diaphragm;

working pressure supply means which supplies working pressure to the back pressure room;

15 a pressure control spring which urges the diaphragm in a direction to make the valve body separate from the valve seat;

working pressure adjust means which adjusts working pressure to be supplied to the back pressure room;

20 gas flow rate detect means which detects flow rate of gas from the outlet or a value corresponding to the flow rate; and

control means which controls the working pressure adjust means so as to adjust the working pressure depending on the flow rate or the value corresponding to flow rate detected by the gas flow rate detect means,

25 wherein

the diaphragm is displaced in a direction to make the valve body come close to the valve seat when gas pressure works

on the measuring room side of the diaphragm,

the diaphragm is displaced in a direction to make the valve body separate from the valve seat when working pressure works on the back pressure room side of the diaphragm, and

5 gas flowing in the measuring room through the inlet and out from the outlet is decompressed by such that collaboration of at least the diaphragm and the pressure control spring makes the valve body move with reference to the valve seat.

10 2. The gas decompression device according to claim 1, wherein the working pressure supply means includes a compressor for compressing air and an air path for supplying working pressure, namely, air compressed by the compressor, to the back pressure room.

15 3. The gas decompression device according to claim 2, wherein the working pressure adjust means includes a pressure switch valve and the pressure switch valve switches states between a pressure supply state for supplying air pressure to the back
20 pressure room and an air release state for releasing air pressure to the back pressure room.

4. The gas decompression device according to claim 3, wherein the control means is an electronic control unit for controlling
25 the pressure switch valve.

5. A gas decompression device which decompresses gas to be

supplied to a fuel cell in fuel cell system, the gas
decompression device comprising:

a body which includes an inlet, an outlet, and an internal
space;

5 a diaphragm which divides the internal space into a
measuring room and a back pressure room;

a valve seat which is provided for the measuring room and
arranged between the inlet and the outlet;

a valve body which is provided for the valve seat and
10 interlocked with the diaphragm;

a compressor which compresses air;

an air path which supplies working pressure derived from
air compressed by the compressor;

a pressure control spring which urges the diaphragm in a
15 direction to make the valve body separate from the valve seat;

a pressure switch valve which is arranged on the air path
so as to adjust working pressure to be supplied to the back
pressure room and switches states between a pressure supply
state for supplying air pressure to the back pressure room and
20 an air release state for releasing air pressure to the back
pressure room;

a flow rate sensor which detects flow rate of gas from the
outlet; and

an electronic control unit which controls the pressure
25 switch valve so as to adjust the working pressure depending on
detected gas flow rate,

wherein

the diaphragm is displaced in a direction to make the valve body come close to the valve seat when gas pressure works on the measuring room side of the diaphragm,

the diaphragm is displaced in a direction to make the
5 valve body separate from the valve seat when working pressure works on the back pressure room side of the diaphragm, and

gas flowing in the measuring room through the inlet and out from the outlet is decompressed by such that collaboration of at least the diaphragm and the pressure control spring makes
10 the valve body move with reference to the valve seat.

6. The gas decompression device according to claim 5, wherein the electronic control unit reads a gas flow rate value detected by the flow rate sensor after start-up of the fuel cell system,
15 calculates a conducting value of the pressure switch valve basing on the gas flow rate value read, and controls the pressure control value basing on the conducting value calculated.

20 7. The gas decompression device according to claim 6, wherein the electronic control unit calculates the conducting value basing on the gas flow rate value detected by referring to predetermined map data which sets relation of optimum conducting values for respective gas flow rate values.

25 8. The gas decompression device according to claim 7, wherein the electronic control unit controls the pressure switch valve's

switching states between the pressure supply state and the air release state in a manner of duty control, and the conducting value is a duty value directed to the duty control.

5 9. The gas decompression device according to claim 1, wherein gas flow rate detect means is a flow rate sensor which detects flow rate of gas to be supplied to the fuel cell.

10 10. The gas decompression device according to claim 1 further comprising stop detect means which detects a stop of the fuel cell system, wherein the control means controls the working pressure adjust means so as to lower the working pressure to atmospheric pressure level when a stop of the fuel cell system is detected by the stop detect means.

15 11. The gas decompression device according to claim 1 further comprising an ignition switch which detects a stop of the fuel cell system, wherein the electronic control unit controls the pressure switch valve to switch to the air release state so as
20 to lower the working pressure to atmospheric pressure level when a stop of the fuel cell system is detected by the ignition switch.